

In the Specification

Please amend the specification as follows:

[0001] (Amended) This is a continuation of pending application 10/243,073 filed 13 September 2002, which is a continuation application of application Serial No. 09/843,927 filed 30 April 2001, now U.S. Patent 6,540,398, which is a division of U.S. Serial No. 09/145,549 filed 02 September 1998, now U.S. Patent 6,267,500, which is a division of U.S. Serial No. 08/848,012 filed 28 April 1997 and now U.S. Patent 5,823,679 issued 20 October 1998. U.S. Serial No. 08/848,012 is a continuation-in-part application of both pending United States Patent applications Serial Nos. 08/764,659 filed on 11th December 1996 and 08/617,265 filed on 18th March 1996 in the names of Milton B. Hollander and W. Earl McKinley for Method and Apparatus for Measuring Temperature Using Infrared Techniques, the latter of which, is a continuation-in-part of United States application Serial No. 08/348,978 filed on 28th November 1994, now U.S. Patent 5,524,984 which in turn was a continuation[[-in-part]] application of then copending United States Patent application Serial No. 08/121,916 filed 17th September 1993, now issued as United States Patent 5,368,392, on 29th November 1994.

[0002] (Amended) The present invention relates generally to a method and apparatus for more accurately measuring the temperature of a surface at a measurement spot, using infrared measurement techniques and, more particularly, to such a method and apparatus which utilizes a laser sighting device which is adapted

to project at least a visible [[circumscribing]] intensive light distribution pattern from a laser sighting beam or beams for more clearly identifying and defining location, position, area, size and the periphery of the energy zone from which the temperature is measured. Generally speaking, this has been accomplished by directing and positioning the laser beam or beams about the periphery of the energy zone or measurement spot by use of three or more stationary laser beams which are focused on the [[periphery of the]] energy zone; or by the use of a controlled single laser beam directed towards [[three or more predetermined locations on]] the periphery of the energy zone. In [[the]] an alternative embodiment, a single laser beam may be rotated around the periphery of the energy zone using, for example, slip rings. In another embodiment, the single rotating laser may be pulsed on and off in a synchronized manner in order to produce a series of intermittent lines outlining the energy zone, thus increasing the efficiency of the laser by concentrating its total wattage in a smaller area, causing a brighter beam. Further, the circumscribing beam or beams may be used in conjunction with [[the]] an additional beam directed at or near and defining a central spot, or larger central area, of the energy zone or measurement spot.

[0003] (Amended) In yet another method and embodiment, at least one laser beam is subdivided by passing it through or over an optical means such as mirrors, prisms, lenses, optical fibres, a beam splitter or a diffraction optical element or grating, for

example, into a plurality of three or more subdivision beams which can form a pattern of illuminated spot areas positioned by said optical means on a target whose energy zone is to be investigated with a radiometer.

[0005] Line 4, change "2983" to -- 1983 --.

[0006] (Amended) When using such radiometers to measure surface temperature, the instrument is aimed at a target or "spot" within the energy zone on the surface on which the measurement is to be taken. The radiometer receives the emitted radiation through the optical system and the heat radiation emanating from the measurement area is imaged onto the detector and is focused upon an infrared sensitive detector which generates a signal which is internally processed and converted into a temperature reading which is displayed.

[0007] (Amended) The precise location or position of the energy zone or measurement spot on the surface as well as its size and area are extremely important to insure accuracy and reliability of the resultant measurement. It will be readily appreciated that the field of view of the optical system[[s]] of such radiometers is such that the diameter of the energy zone increases directly with the distance to the target. The typical energy zone of such radiometers is defined as where 90% of the energy focused upon the detector is found. Heretofore, there have been no means of accurately determining the perimeter, area, size and location of the actual energy zone unless it is approximated by the use of a "distance to target table" or by actual physical measurement.

[0015] Line 2, after "problem" change "o" to -- or --.

[0016] (Amended) Proposals have [[ben]] been made in the prior art for indicating an energy zone area of a target surface by means visible to the eye [[on the target]].

[0028] Line 3, after "size" change "nd" to --and --.

[0030] (Amended) It is a still further object of the present invention to provide a method and apparatus which permits the use of a single laser beam which is subdivided by passing it through, or over, an optical means such as a beam splitter, holographic element or a diffraction grating, aligned to be illuminated by said single laser beam, thereby to form and position a plurality of three or more subdivision beams which provide a light intensity distribution circular pattern where they strike a target surface whose energy zone at a measurement spot is to be investigated.

[0036] (Amended) In a still further embodiment, the temperature measurement device comprises a detector for receiving the heat radiation from a measuring point, spot or zone [of the] on an object of measurement under examination. Integral to the equipment is a direction finder, i.e. a sighting device using a laser beam as the light source and incorporating an optical means such as a diffractive optic, i.e. a holographic component such as a diffraction grating, or a beam splitter, with which the light intensity distribution is also shown and the position and size of the heat source is indicated. The marker system relates to a predetermined percentage, e.g. 90%, of the energy of the radiated heat.

[0084] (Amended) The laser 1012 of the sighting device 1000 in Figure 11 is adapted to rotate about the pivot 1020 when driven by the motor 1021. Thus, the laser 1012 is able to project a laser beam 1014 with a circle-type pattern positioned against a target (not shown). During rotation, centrifugal force will act upon the counterweights 1015A and 1015B causing the laser 1012 to tilt. The angle at which it tilts can be controlled by the screw adjustment 1013 and 1011. The angle is adjusted to correspond to the [infrared detector] field of view of the infrared detector in which the sighting device is used. The laser beam 1014 will then follow the periphery of the target zone of the infrared detector (not shown). Once the motor 1021 is turned off, the return spring 1019 will cause the laser 1012 to center. In this manner, the central laser beam 1014 also (seen in Fig. 18 at 1406) will now be in the ~~zenith~~zero of the target zone. This serves as a calibration for the user and insures that the laser sighting device is properly aimed.

[0093] (Amended) Figures 18 and 19 illustrate yet another and preferred best mode version of the laser sighting device of the present invention, in combination with a radiometer. In this embodiment, a conventional radiometer 1400 is provided. A laser sighting device denoted generally by reference numeral 1401 has a single-beam laser generator 1402 which produces the laser beam 1403. Aligned axially with the laser beam 1403, and in front of the laser generator 1402, there is positioned a support 1404 housing an optical means such as a beam splitter, holographic

component or a diffraction grating 1405. In this instance, the diffraction grating optical element means 1405 is selected when struck or illuminated by the laser beam 1403 to produce a visible diffraction pattern on the measurement surface, from the entering single beam 1403, as both a 0 order central beam 1406 and a total of twelve sub-division beams 1403a which are concentric with and symmetrically divergent about both the axis and central beam 1406 and form a ring of intensive surface light spots, positioned by said diffraction beam splitter for location and identification of the position and size of the measurement surface area. Referring to Figure 19 there is shown the concentric light intensity distribution pattern of more than two laser light spots 1403b radially displaced from the central beam 1406 and [[which are]] formed on the measurement surface at individual mutually spaced locations as a ring of spots 1403b, where the sub-division beams 1403a strike the target 1407 whose temperature is to be investigated. Due to the nature of the diffraction grating 1405, spots 1403b are circumferentially equidistantly spaced by distance B in a circle positioned by the element 1405 about the axis of the laser beam 1403, and the total spread of the sub-division beams 1403a is a width A which depends upon the [[axial]] distance of the device from the target 1407. Adjacent to and laterally of the laser generator 1402 in its support 1404 there is positioned a radiometer 1400 whose viewing axis is parallel to the axis and central beam 1406 of the generated laser [[beam]] beams 1403a, but

which may if desired be made adjustable with respect to the axis and central beam 1406 so that a selected area of the target, perhaps not at the center of the dots 1403b, may be investigated.

[0095] (Amended) Referring to Figure 20, there is shown schematically a modification wherein the radiometer 1400 is situated on the central longitudinal axis of the laser generator 1401 and within said plurality of laser beams at a suitable distance downstream of the diffraction grating so as not to [[interference]] interfere with the transmission of the sub-division beams [[to]] which form the pattern of spots.